

Title (en)

OPTICAL MULTILAYER STRUCTURE AND ITS PRODUCTION METHOD, OPTICAL SWITCHING DEVICE, AND IMAGE DISPLAY

Title (de)

MEHRSCHICHTIGE OPTISCHE STRUKTUR UND HERSTELLUNGSVERFAHREN DAFÜR, OPTISCHE SCHALTEINRICHTUNG UND BILDANZEIGE

Title (fr)

STRUCTURE OPTIQUE MULTICOUCHE ET PROCEDE DE PRODUCTION ASSOCIE, DISPOSITIF DE COMMUTATION OPTIQUE ET AFFICHAGE D'IMAGES

Publication

EP 1406109 B1 20140917 (EN)

Application

EP 02746024 A 20020712

Priority

- JP 0207124 W 20020712
- JP 2001212251 A 20010712

Abstract (en)

[origin: US2004027701A1] Provided is an optical multilayer structure having a simpler configuration, flexibility in selection of materials and improved reliability in wiring and capable of high-speed response even in a visible light range. A optical multilayer structure (1) comprises a first layer (11) being light-absorptive and making contact with a substrate (10), a gap portion (12) having as large a size as light interference phenomenon can occur and being capable of varying the size, and a second layer (13) being transparent in this order on the substrate (10). Where a complex refractive index of the first layer (11) is $N_1 (=n_1 - i.k_1)$, n_1 is a refractive index, k_1 is an extinction coefficient, and i is an imaginary unit, a refractive index of the second layer (13) is n_2 , and a refractive index of an incident medium is 1.0, the optical multilayer structure (1) is configured so as to satisfy the following formula.

$$\frac{1}{N_1} = \frac{1}{N_2} \frac{1}{\cos^2 \theta_1} \frac{1}{\cos^2 \theta_2} \frac{1}{\cos^2 \theta_3} \frac{1}{\cos^2 \theta_4} \frac{1}{\cos^2 \theta_5} \frac{1}{\cos^2 \theta_6} \frac{1}{\cos^2 \theta_7} \frac{1}{\cos^2 \theta_8} \frac{1}{\cos^2 \theta_9} \frac{1}{\cos^2 \theta_{10}} \frac{1}{\cos^2 \theta_{11}} \frac{1}{\cos^2 \theta_{12}} \frac{1}{\cos^2 \theta_{13}} \frac{1}{\cos^2 \theta_{14}} \frac{1}{\cos^2 \theta_{15}} \frac{1}{\cos^2 \theta_{16}} \frac{1}{\cos^2 \theta_{17}} \frac{1}{\cos^2 \theta_{18}} \frac{1}{\cos^2 \theta_{19}} \frac{1}{\cos^2 \theta_{20}} \frac{1}{\cos^2 \theta_{21}} \frac{1}{\cos^2 \theta_{22}} \frac{1}{\cos^2 \theta_{23}} \frac{1}{\cos^2 \theta_{24}} \frac{1}{\cos^2 \theta_{25}} \frac{1}{\cos^2 \theta_{26}} \frac{1}{\cos^2 \theta_{27}} \frac{1}{\cos^2 \theta_{28}} \frac{1}{\cos^2 \theta_{29}} \frac{1}{\cos^2 \theta_{30}} \frac{1}{\cos^2 \theta_{31}} \frac{1}{\cos^2 \theta_{32}} \frac{1}{\cos^2 \theta_{33}} \frac{1}{\cos^2 \theta_{34}} \frac{1}{\cos^2 \theta_{35}} \frac{1}{\cos^2 \theta_{36}} \frac{1}{\cos^2 \theta_{37}} \frac{1}{\cos^2 \theta_{38}} \frac{1}{\cos^2 \theta_{39}} \frac{1}{\cos^2 \theta_{40}} \frac{1}{\cos^2 \theta_{41}} \frac{1}{\cos^2 \theta_{42}} \frac{1}{\cos^2 \theta_{43}} \frac{1}{\cos^2 \theta_{44}} \frac{1}{\cos^2 \theta_{45}} \frac{1}{\cos^2 \theta_{46}} \frac{1}{\cos^2 \theta_{47}} \frac{1}{\cos^2 \theta_{48}} \frac{1}{\cos^2 \theta_{49}} \frac{1}{\cos^2 \theta_{50}} \frac{1}{\cos^2 \theta_{51}} \frac{1}{\cos^2 \theta_{52}} \frac{1}{\cos^2 \theta_{53}} \frac{1}{\cos^2 \theta_{54}} \frac{1}{\cos^2 \theta_{55}} \frac{1}{\cos^2 \theta_{56}} \frac{1}{\cos^2 \theta_{57}} \frac{1}{\cos^2 \theta_{58}} \frac{1}{\cos^2 \theta_{59}} \frac{1}{\cos^2 \theta_{60}} \frac{1}{\cos^2 \theta_{61}} \frac{1}{\cos^2 \theta_{62}} \frac{1}{\cos^2 \theta_{63}} \frac{1}{\cos^2 \theta_{64}} \frac{1}{\cos^2 \theta_{65}} \frac{1}{\cos^2 \theta_{66}} \frac{1}{\cos^2 \theta_{67}} \frac{1}{\cos^2 \theta_{68}} \frac{1}{\cos^2 \theta_{69}} \frac{1}{\cos^2 \theta_{70}} \frac{1}{\cos^2 \theta_{71}} \frac{1}{\cos^2 \theta_{72}} \frac{1}{\cos^2 \theta_{73}} \frac{1}{\cos^2 \theta_{74}} \frac{1}{\cos^2 \theta_{75}} \frac{1}{\cos^2 \theta_{76}} \frac{1}{\cos^2 \theta_{77}} \frac{1}{\cos^2 \theta_{78}} \frac{1}{\cos^2 \theta_{79}} \frac{1}{\cos^2 \theta_{80}} \frac{1}{\cos^2 \theta_{81}} \frac{1}{\cos^2 \theta_{82}} \frac{1}{\cos^2 \theta_{83}} \frac{1}{\cos^2 \theta_{84}} \frac{1}{\cos^2 \theta_{85}} \frac{1}{\cos^2 \theta_{86}} \frac{1}{\cos^2 \theta_{87}} \frac{1}{\cos^2 \theta_{88}} \frac{1}{\cos^2 \theta_{89}} \frac{1}{\cos^2 \theta_{90}} \frac{1}{\cos^2 \theta_{91}} \frac{1}{\cos^2 \theta_{92}} \frac{1}{\cos^2 \theta_{93}} \frac{1}{\cos^2 \theta_{94}} \frac{1}{\cos^2 \theta_{95}} \frac{1}{\cos^2 \theta_{96}} \frac{1}{\cos^2 \theta_{97}} \frac{1}{\cos^2 \theta_{98}} \frac{1}{\cos^2 \theta_{99}} \frac{1}{\cos^2 \theta_{100}} \frac{1}{\cos^2 \theta_{101}} \frac{1}{\cos^2 \theta_{102}} \frac{1}{\cos^2 \theta_{103}} \frac{1}{\cos^2 \theta_{104}} \frac{1}{\cos^2 \theta_{105}} \frac{1}{\cos^2 \theta_{106}} \frac{1}{\cos^2 \theta_{107}} \frac{1}{\cos^2 \theta_{108}} \frac{1}{\cos^2 \theta_{109}} \frac{1}{\cos^2 \theta_{110}} \frac{1}{\cos^2 \theta_{111}} \frac{1}{\cos^2 \theta_{112}} \frac{1}{\cos^2 \theta_{113}} \frac{1}{\cos^2 \theta_{114}} \frac{1}{\cos^2 \theta_{115}} \frac{1}{\cos^2 \theta_{116}} \frac{1}{\cos^2 \theta_{117}} \frac{1}{\cos^2 \theta_{118}} \frac{1}{\cos^2 \theta_{119}} \frac{1}{\cos^2 \theta_{120}} \frac{1}{\cos^2 \theta_{121}} \frac{1}{\cos^2 \theta_{122}} \frac{1}{\cos^2 \theta_{123}} \frac{1}{\cos^2 \theta_{124}} \frac{1}{\cos^2 \theta_{125}} \frac{1}{\cos^2 \theta_{126}} \frac{1}{\cos^2 \theta_{127}} \frac{1}{\cos^2 \theta_{128}} \frac{1}{\cos^2 \theta_{129}} \frac{1}{\cos^2 \theta_{130}} \frac{1}{\cos^2 \theta_{131}} \frac{1}{\cos^2 \theta_{132}} \frac{1}{\cos^2 \theta_{133}} \frac{1}{\cos^2 \theta_{134}} \frac{1}{\cos^2 \theta_{135}} \frac{1}{\cos^2 \theta_{136}} \frac{1}{\cos^2 \theta_{137}} \frac{1}{\cos^2 \theta_{138}} \frac{1}{\cos^2 \theta_{139}} \frac{1}{\cos^2 \theta_{140}} \frac{1}{\cos^2 \theta_{141}} \frac{1}{\cos^2 \theta_{142}} \frac{1}{\cos^2 \theta_{143}} \frac{1}{\cos^2 \theta_{144}} \frac{1}{\cos^2 \theta_{145}} \frac{1}{\cos^2 \theta_{146}} \frac{1}{\cos^2 \theta_{147}} \frac{1}{\cos^2 \theta_{148}} \frac{1}{\cos^2 \theta_{149}} \frac{1}{\cos^2 \theta_{150}} \frac{1}{\cos^2 \theta_{151}} \frac{1}{\cos^2 \theta_{152}} \frac{1}{\cos^2 \theta_{153}} \frac{1}{\cos^2 \theta_{154}} \frac{1}{\cos^2 \theta_{155}} \frac{1}{\cos^2 \theta_{156}} \frac{1}{\cos^2 \theta_{157}} \frac{1}{\cos^2 \theta_{158}} \frac{1}{\cos^2 \theta_{159}} \frac{1}{\cos^2 \theta_{160}} \frac{1}{\cos^2 \theta_{161}} \frac{1}{\cos^2 \theta_{162}} \frac{1}{\cos^2 \theta_{163}} \frac{1}{\cos^2 \theta_{164}} \frac{1}{\cos^2 \theta_{165}} \frac{1}{\cos^2 \theta_{166}} \frac{1}{\cos^2 \theta_{167}} \frac{1}{\cos^2 \theta_{168}} 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\frac{1}{\cos^2 \theta_{202}} \frac{1}{\cos^2 \theta_{203}} \frac{1}{\cos^2 \theta_{204}} \frac{1}{\cos^2 \theta_{205}} \frac{1}{\cos^2 \theta_{206}} \frac{1}{\cos^2 \theta_{207}} \frac{1}{\cos^2 \theta_{208}} \frac{1}{\cos^2 \theta_{209}} \frac{1}{\cos^2 \theta_{210}} \frac{1}{\cos^2 \theta_{211}} \frac{1}{\cos^2 \theta_{212}} \frac{1}{\cos^2 \theta_{213}} \frac{1}{\cos^2 \theta_{214}} \frac{1}{\cos^2 \theta_{215}} \frac{1}{\cos^2 \theta_{216}} \frac{1}{\cos^2 \theta_{217}} \frac{1}{\cos^2 \theta_{218}} \frac{1}{\cos^2 \theta_{219}} \frac{1}{\cos^2 \theta_{220}} \frac{1}{\cos^2 \theta_{221}} \frac{1}{\cos^2 \theta_{222}} \frac{1}{\cos^2 \theta_{223}} \frac{1}{\cos^2 \theta_{224}} \frac{1}{\cos^2 \theta_{225}} \frac{1}{\cos^2 \theta_{226}} \frac{1}{\cos^2 \theta_{227}} \frac{1}{\cos^2 \theta_{228}} \frac{1}{\cos^2 \theta_{229}} \frac{1}{\cos^2 \theta_{230}} \frac{1}{\cos^2 \theta_{231}} \frac{1}{\cos^2 \theta_{232}} \frac{1}{\cos^2 \theta_{233}} \frac{1}{\cos^2 \theta_{234}} \frac{1}{\cos^2 \theta_{235}} \frac{1}{\cos^2 \theta_{236}} \frac{1}{\cos^2 \theta_{237}} \frac{1}{\cos^2 \theta_{238}} \frac{1}{\cos^2 \theta_{239}} \frac{1}{\cos^2 \theta_{240}} \frac{1}{\cos^2 \theta_{241}} \frac{1}{\cos^2 \theta_{242}} \frac{1}{\cos^2 \theta_{243}} \frac{1}{\cos^2 \theta_{244}} \frac{1}{\cos^2 \theta_{245}} \$$

IPC 8 full level

G02B 26/00 (2006.01); **B81B 7/02** (2006.01); **G02B 5/28** (2006.01); **G02B 26/02** (2006.01); **G02B 26/08** (2006.01)

CPC (source: EP KR US)

G02B 26/001 (2013.01 - EP US); **G02B 26/02** (2013.01 - EP US); **G02B 26/08** (2013.01 - KR); **G02B 26/0833** (2013.01 - EP US); **G02B 26/0841** (2013.01 - EP US); **G02B 26/085** (2013.01 - EP US)

Designated contracting state (EPC)

DE FR GB

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US 2004027701 A1 20040212; US 6850365 B2 20050201; CN 1266509 C 20060726; CN 1464986 A 20031231; EP 1406109 A1 20040407; EP 1406109 A4 20100818; EP 1406109 B1 20140917; JP 2003029169 A 20030129; JP 4032216 B2 20080116; KR 100937839 B1 20100121; KR 20040020858 A 20040309; WO 03007050 A1 20030123

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